Objective Bayesian Variable Selection for Binomial Regression Models with Jeffreys's Prior

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We study several theoretical properties of Jeffreys's prior for binomial regression models with a focus on its applications to variable selection problems. We show that Jeffreys's prior is symmetric and unimodal about 0 and always has lighter tails than a *t* distribution and heavier tails than a normal distribution for a class of binomial regression models. We also develop an efficient importance sampling algorithm for calculating the prior and posterior normalizing constants based on Jeffreys's prior. Moreover, we show that the prior and posterior normalizing constants under Jeffreys's prior are scale invariant in the covariates. A closed form for Jeffreys's prior is obtained for saturated binomial regression models with binary covariates. Detailed simulation studies are presented to demonstrate its properties and performance in variable selection contexts and a real dataset is also analyzed to further illustrate the proposed methodology. This is a joint work with Joseph G. Ibrahim and Sungduk Kim.